Chapter XXIV

Material Flow Management in the Machine Building Industry

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INTRODUCTION

Within Germany's industry the issue of environmental protection has increased in importance within recent years. A distinct indicator to support this thesis is the voluntary participation in the implementation of the EMAS by more than 2000 company sites. One reason for this is a shift in the perception of industrial environmental protection over the past years. Previous environmental protection was mostly sensed as a bureaucratic burden. Today, the enterprises take an active part in using environmental protection successfully for achieving company business aims by setting-up environmental management systems.

This chapter focuses on the issue of material flow management as an approach to optimise a company's economical and environmental performance. Material flow management comprises the identification, analysis and optimisation of procurement, usage, handling, transformation and disposal of all physical goods within a company. A physical good in the context of material flow management does not only comprise raw materials and semi-finished products but especially all those materials that have not been dealt with in common management and information systems such as waste, energy, commodities, etc.

This chapter describes contents and potentials of material flow management. It especially contains a description of the specification and introduction of an Environmental Management Information Systems (EMIS) which offers special support in the area of material flow management to a machine building company.

BACKGROUND

Although the introduction of an environmental organisation is a necessary first step, today's company practice is often marked by a lack of transparency of the environmental relevance of inner-company material flows and its costs. Within today's environmental management systems, basic input-output-analysis represents the central information basis for the identification of weak points and potential improvements (Jürgens et al., 1997). In an input-output-analysis all incoming and outgoing material and energy flows are summarised over an entire company site and represented in a table. With this approach, rough evaluations about the environmental relevance of a company's operations can be made. A major drawback is, though, that an input-output-analysis does not support the allocation of environmentally relevant material flows to products and/or single processes. This leads to the consequence that their origin can not be identified. Additionally a cost-oriented optimisation of the company's operations can not be achieved solely by deploying input-output-tables.

To illustrate this issue, it is insufficient to estimate the costs for waste based only on the expenses for their removal. This would lead to the situation that all effort spent on the waste material along its flow through the supply chain such as purchase, handling, collection, separation into waste fractions and other value-adding activities are not being taken into consideration, although they considerably add to costs. Single examples in which a waste material cost analysis has been carried out are showing that the real incidental costs by accruement of waste material are much larger than the focus on the individual disposal costs indicates (Bullinger and Jürgens, 1999; Loew and Jürgens, 1999).

If the transparency of environmental and cost aspects of inner company material flows will be improved, the installation of a company's material flow management is of vital importance. The following part deals shortly with the procedure of setting up a material flow management system. In a second part it will demonstrate, how a regularly updated information basis for decision support can be established within a material flow management system by the connection of an environmental management information system to SAP/R3.

MATERIAL FLOW MANAGEMENT

Potentials within material flow management

Current approaches and concepts for production, planning and control are oriented towards mapping and planning of relevant core processes, products and materials. Auxiliary and operating materials, co-products, energy consumption, and waste materials are generally neglected. With this approach, only sub-optima will be obtained. This holds true especially if the individual areas of responsibility within a company are organised in a decentralised cost-centre oriented manner and if those centres exclusively concentrate on the cost-cuttings of the company's production processes. In order to reach the aim of an holistic optimisation of the company's activities, a systematic and company-wide consideration of all material flows is necessary.

Within the concept of material flow management the company's environmental performance will be measured and evaluated in regularly intervals. The most